

In The Claims:

1. (Amended) A method for generating turbulence of an air-fuel mixture in a combustion chamber of a multi-valve engine, said engine having at least first and second intake valve members each independently activated by an actuator member, with the activation of the actuator member being controlled by an engine controller unit, the method comprising the steps of:

a¹ determining a first operating condition, a second operating condition, and a third operating condition of the engine;

separately operating the intake valve members to generate an air-fuel turbulence in the engine combustion chamber corresponding at least in part to the first, second and third operating conditions, so that under a first operating condition a high swirl, no tumble turbulence is formed, under a second operating condition a swirl and tumble turbulence is formed, and under a third operating condition a tumble, no swirl turbulence is formed;

wherein the optimum air-fuel turbulence is created for the operating condition to maximize fuel efficiency and minimize undesirable emissions.

a² 15. (Amended) A process for optimizing the air-flow motion in the cylinder combustion chambers of a multi-valve engine, each of said cylinders having a first intake valve and a second intake valve, both of said first and second intake valves being individually and independently operated, and the engine having an electronic controller for operating said first and second intake valves, said process comprising the steps of:

establishing a plurality of operating conditions for the engine based on engine load and speed;

preparing a look-up table based on said plurality of operating conditions;

operating said first and second intake valves depending on the look-up table relative to a first engine load and speed; and

generating an air flow motion in the cylinder combustion chamber corresponding to one of said plurality of operating conditions, so that under a first

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operating condition of said plurality of operating conditions a high swirl, no tumble turbulence is formed, under a second operating condition of said plurality of operating conditions a swirl and tumble turbulence is formed and, and under a third operating condition of said plurality of operating conditions a tumble, no swirl turbulence is formed.

16. (Amended) A system for generating turbulence of an air-fuel mixture in a combustion chamber of a multi-valve engine, said engine having at least first and second intake valve members, and a controller unit, said system comprising:

means for determining a first operating condition, a second operating condition, and a third operating condition of the engine;

means for separately operating said first and second intake valve members in order to generate a desired air-fuel turbulence in the engine combustion chamber corresponding at least in part to said first, second and third operating conditions, so that under a first operating condition a high swirl, no tumble turbulence is formed, under a second operating condition a swirl and tumble turbulence is formed, and under a third operating condition a tumble, no swirl turbulence is formed;

wherein an optimum air fuel turbulence is created for said operating condition to maximize fuel efficiency and minimize undesirable emissions.